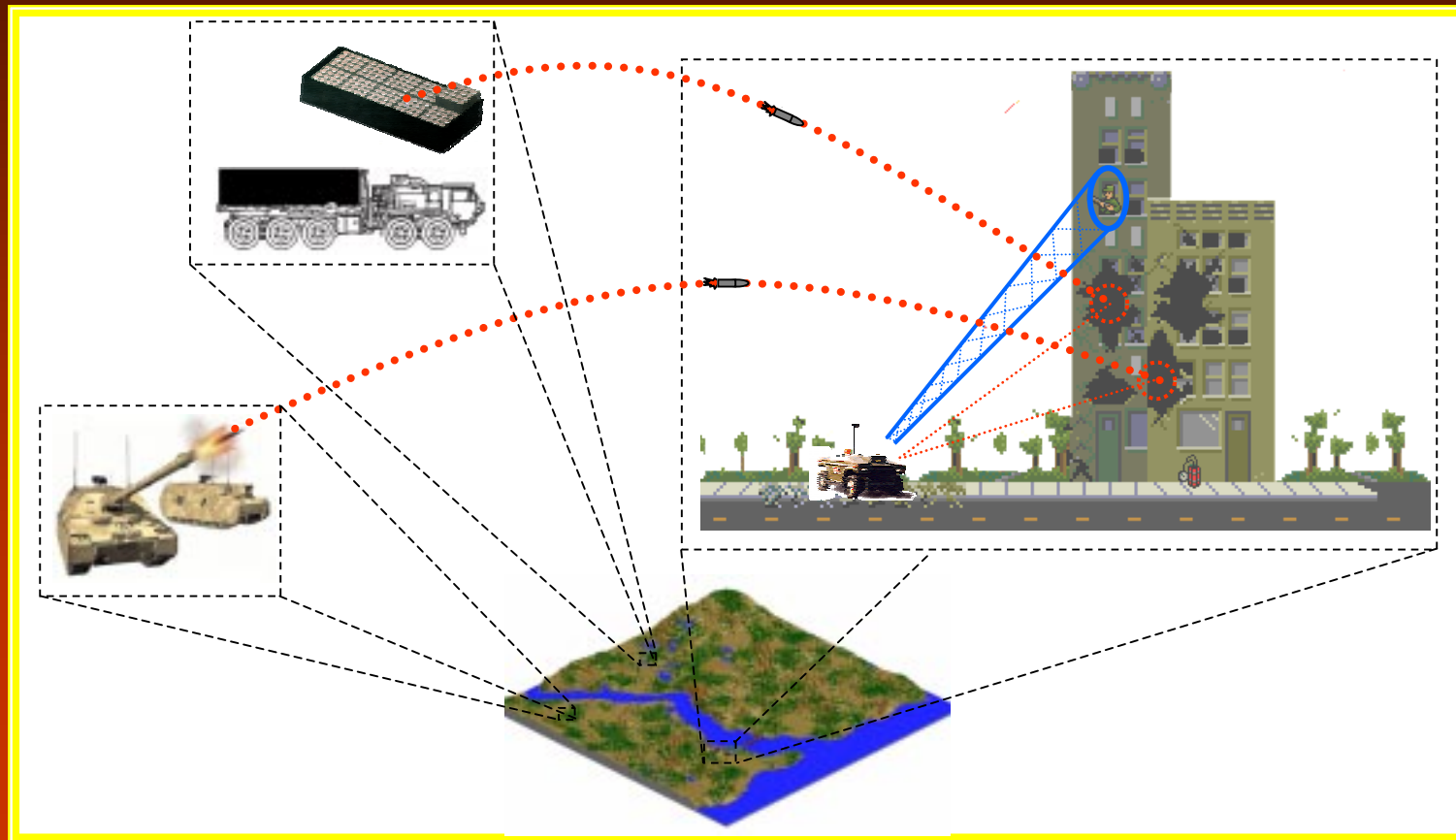




# Multi-Mission Combat Systems

Dr. Marilyn Freeman, DARPA TTO





# The Past - Desert Storm



- 525,000 US troops deployed
- 7 month deployment period via ships and air
- Strategic Airlift:
  - 4.65 billion ton-miles (697.5 million for Berlin Airlift)
  - 20,500 missions; 534,000 passengers; 542,000 tons
- Ground Forces Example - VII Corps Support:
  - 150,000 troops, 50,000 combat vehicles
  - Estimated 800,000 gallons diesel/day consumption
  - Required 3,300,000 gallons diesel/day (11,500 tons)





# The Present - Kosovo



- Quick reaction desired → rapid deployment

- Mission / Force Option/ Estimates

- 8,000 troops to secure border
- 75,000 troops to liberate Kosovo
- 200,000 troops to occupy and monitor

- Troop transport - not the hard part

- 240,000 troops to Desert Shield in 1 month
- Vehicles & support not available for many weeks

- Full Deployment Options

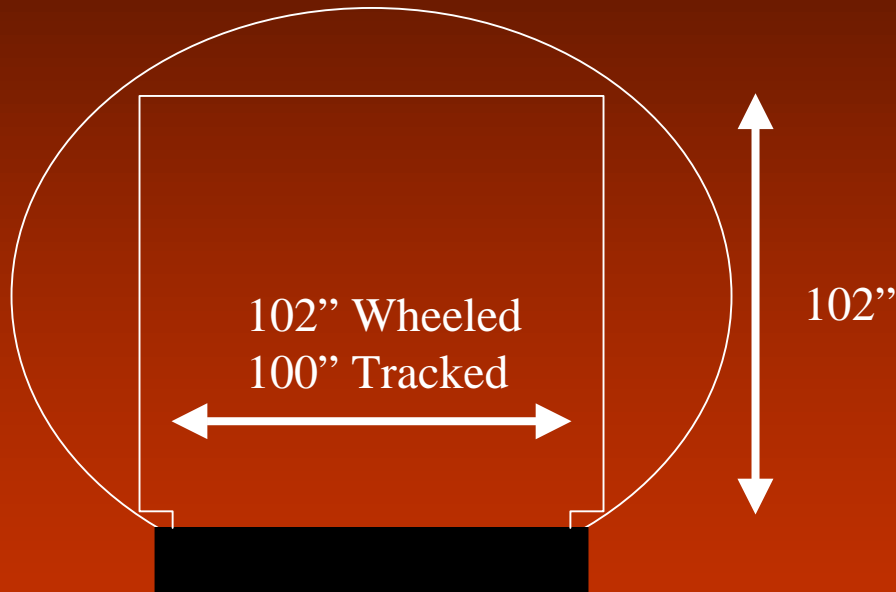
- Rapid Reaction → Air Transport
- Tactical Insertion → C-130/C-17
- Urgency Rules Out Strategic Sea lift





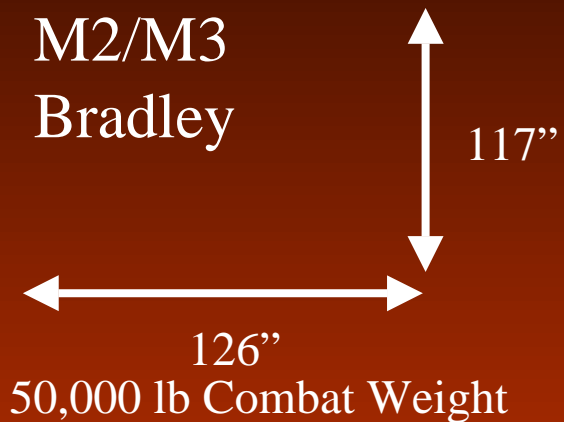
# Deployability & Transportability Challenges

## C-130J Size Limitations

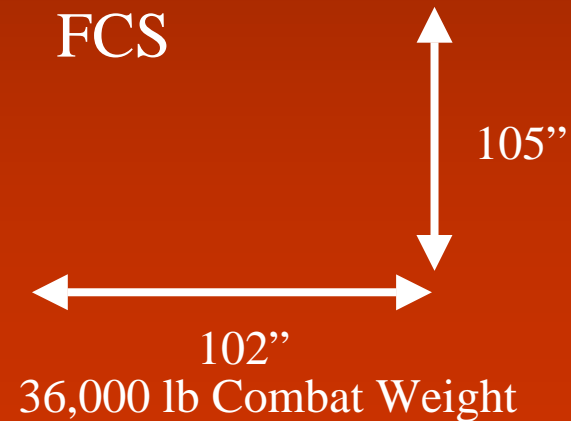


C-130J: 36,000-40,000 lb  
Payload Capacity

M2/M3  
Bradley



FCS





# Design Drivers



- Weight

- 40%-50% of manned combat vehicle weight is armor
- 20% is weapons system
- 20% is drive train



- Size

- Vehicle height is determined by human factors
  - › M1 A1 Abrams - 3.25 ft. height for reclined driver
  - › M3 Bradley -  $\geq 4$  ft. for seated troops

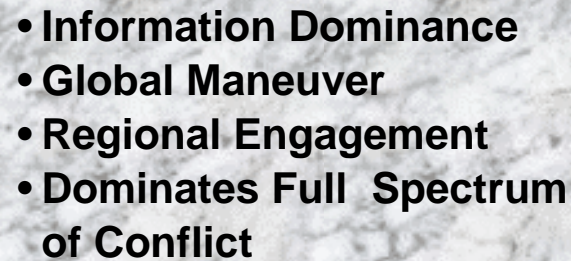
- Width

- › Maximums are transportability related
- › Minimums are subsystem spacing or human factors related



- Volume (MBT)

- › Approximately 30% of volume is attributed to crew

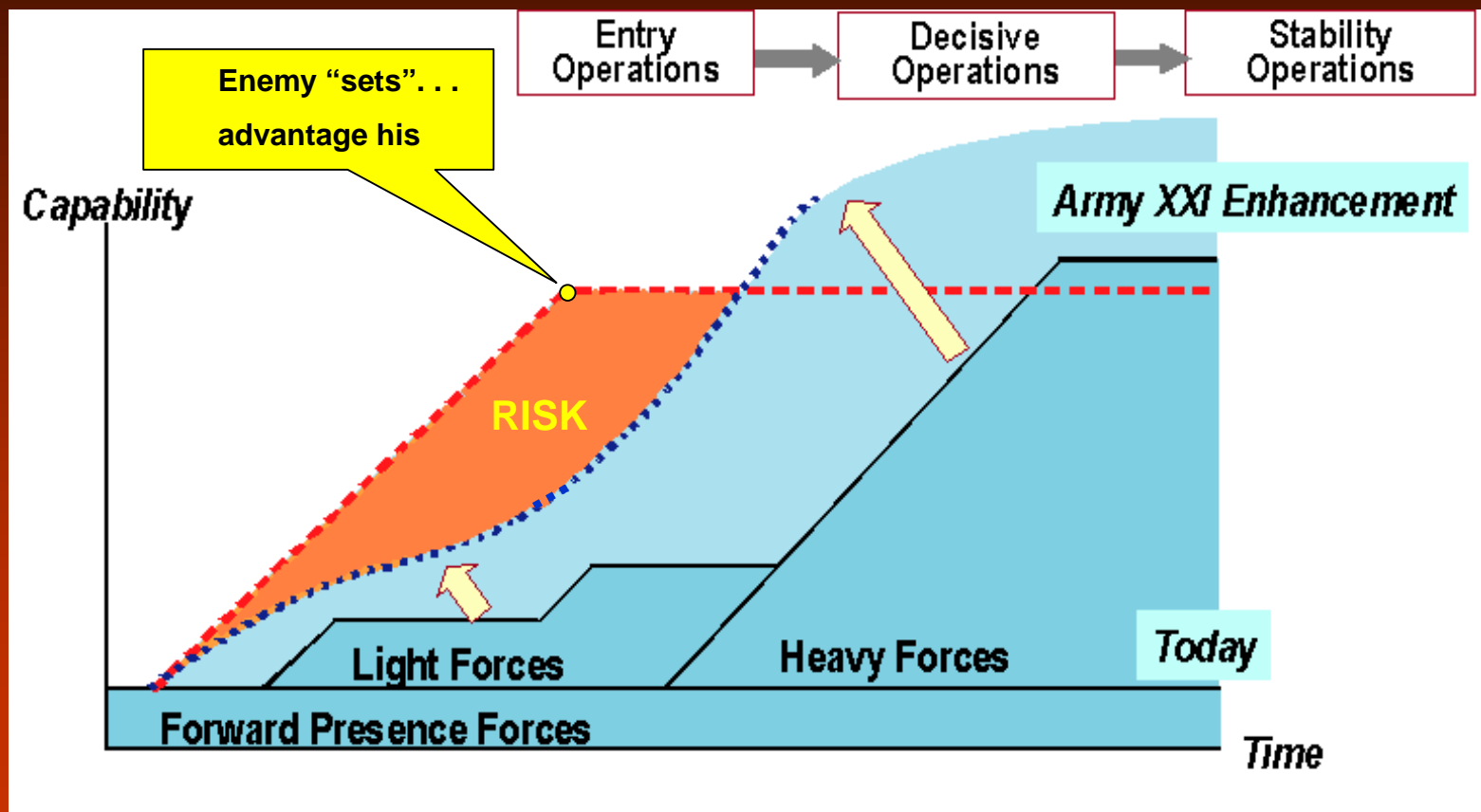


- # Capabilities



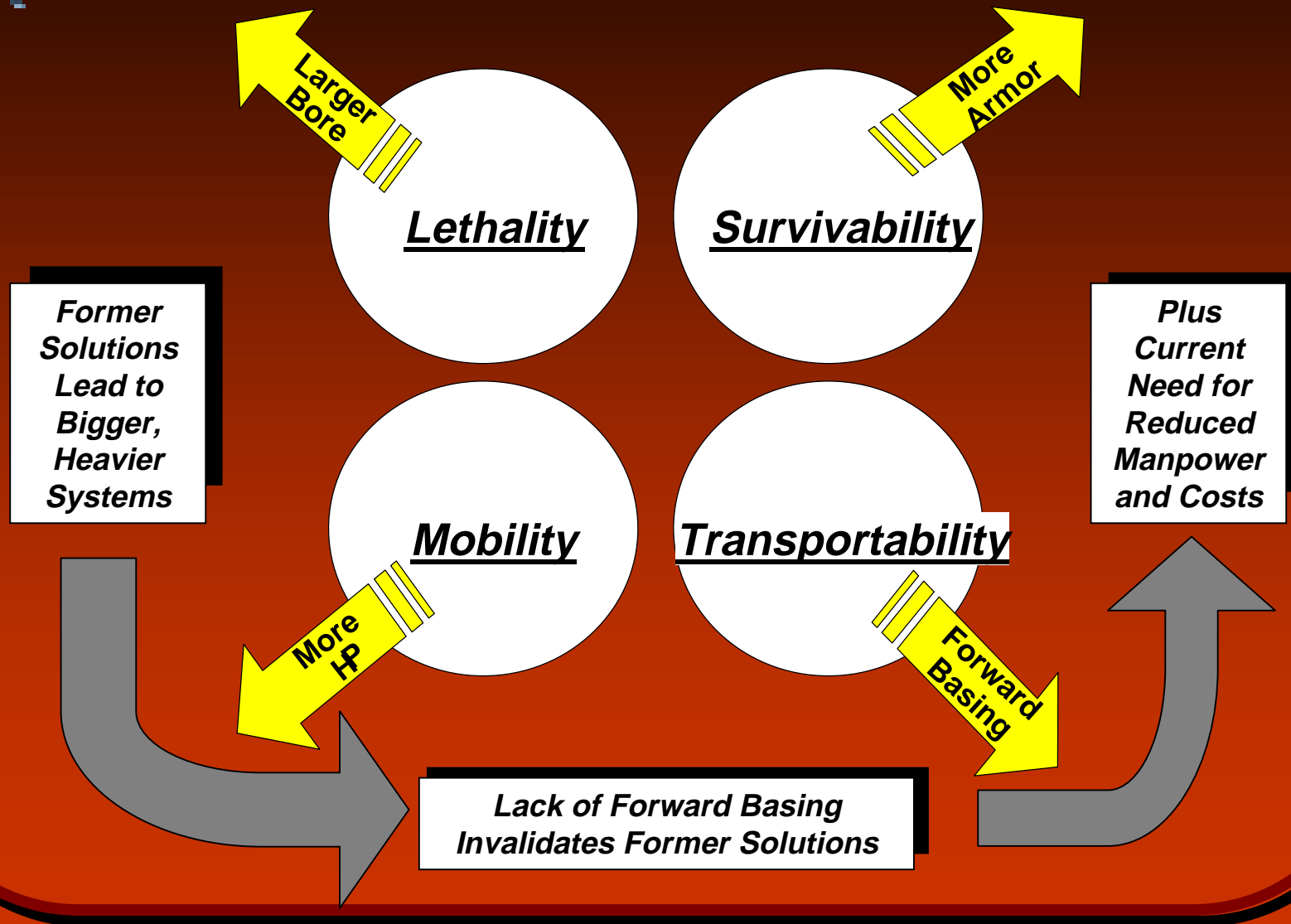


# What Are We Trying to Fix?



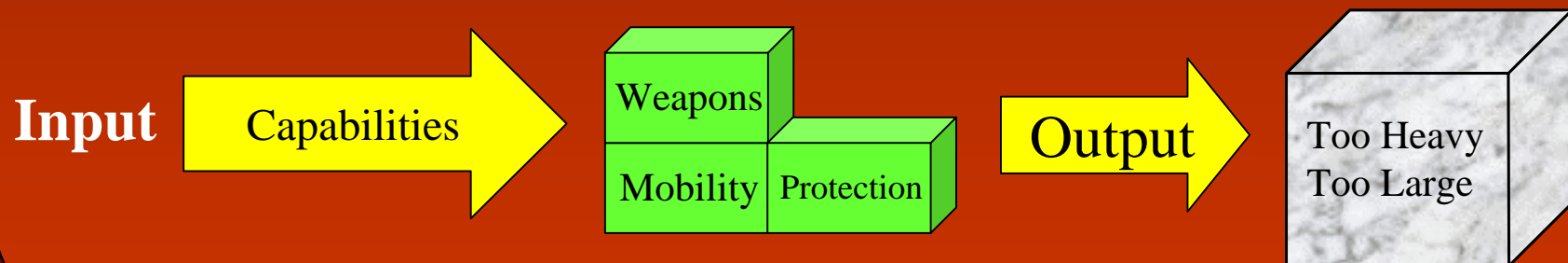
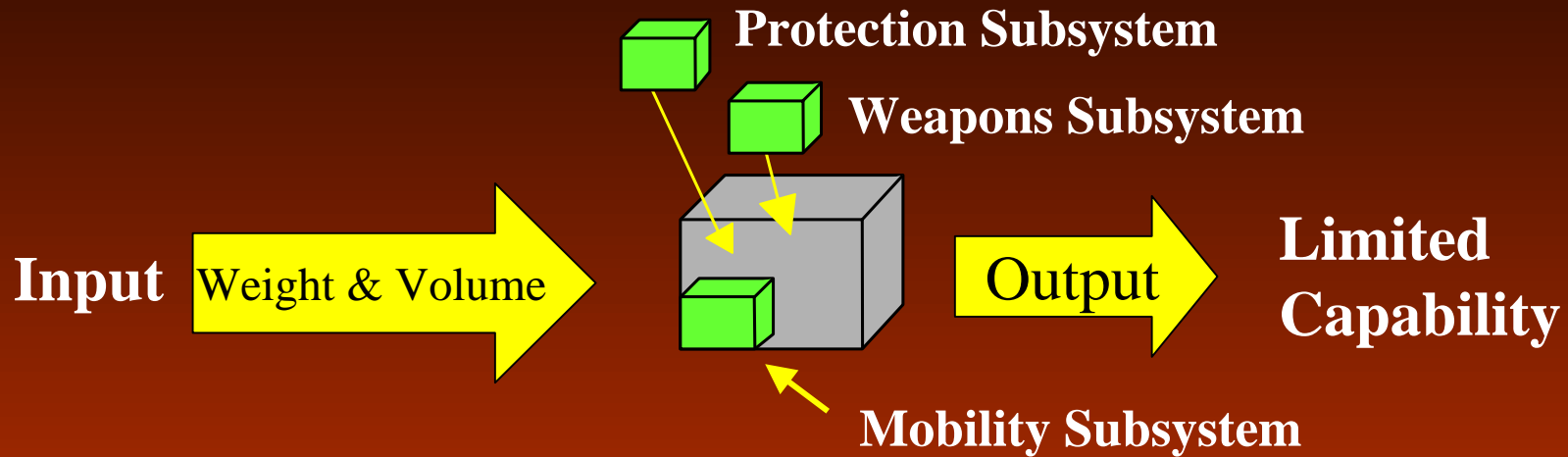


# What Limits Past Solutions?



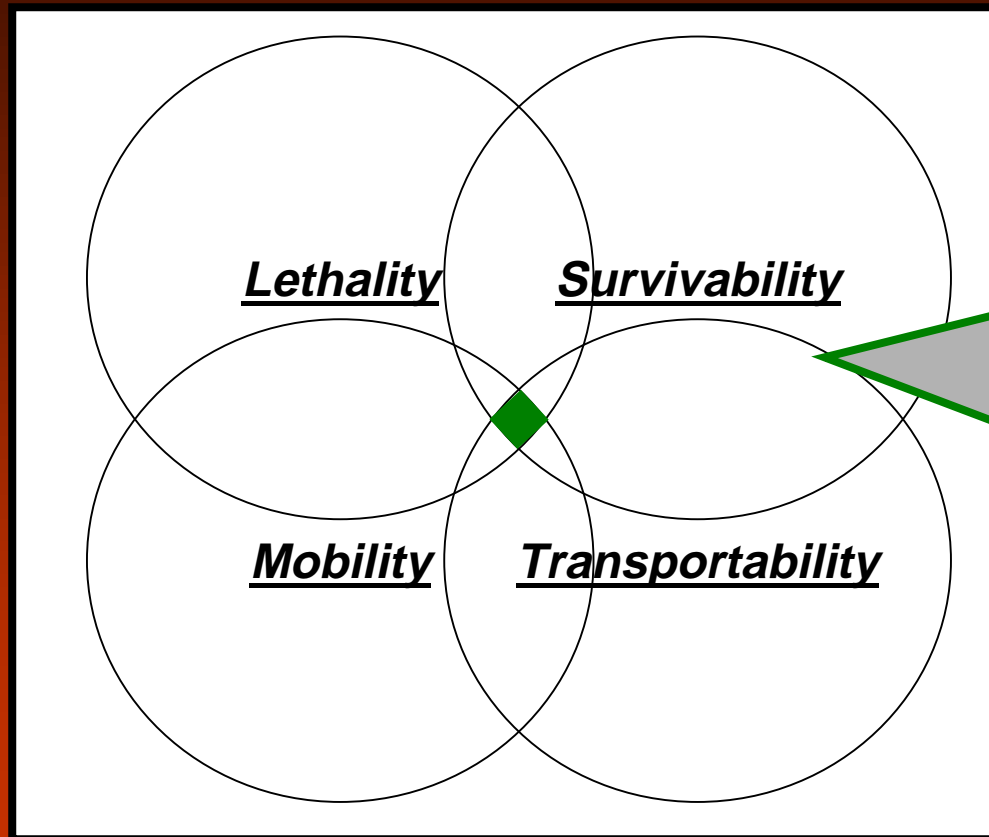


# Current Design Approaches





# Multi-Mission Combat Systems - A New Approach



## Common Solutions

- Reduced Size
- Stealth
- Reduce/Eliminate Crew

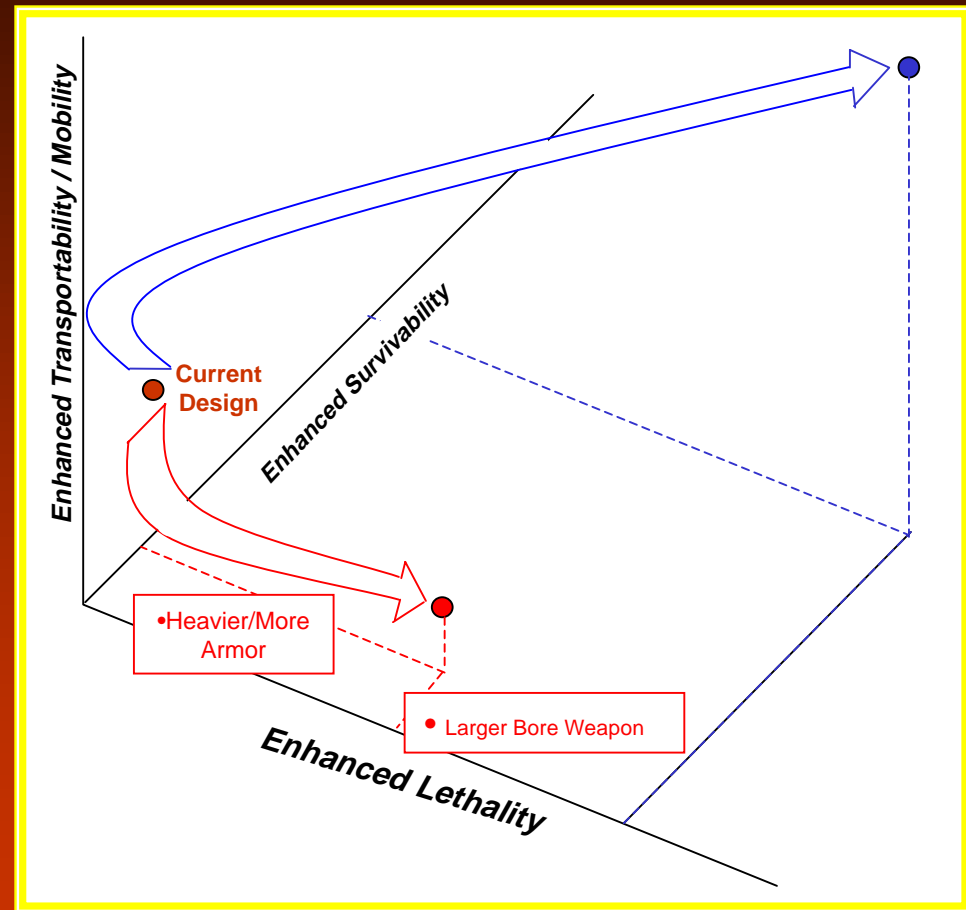
## Technologies

- Robotics
- Electric Propulsion
- Adv Lethality
- Active Protection



# DARPA/Army Study Goals

- Identify potential solutions and new approaches
- Provide convincing data supporting high payoff
- Explore and demonstrate high risk solutions and/or novel approaches to ground combat

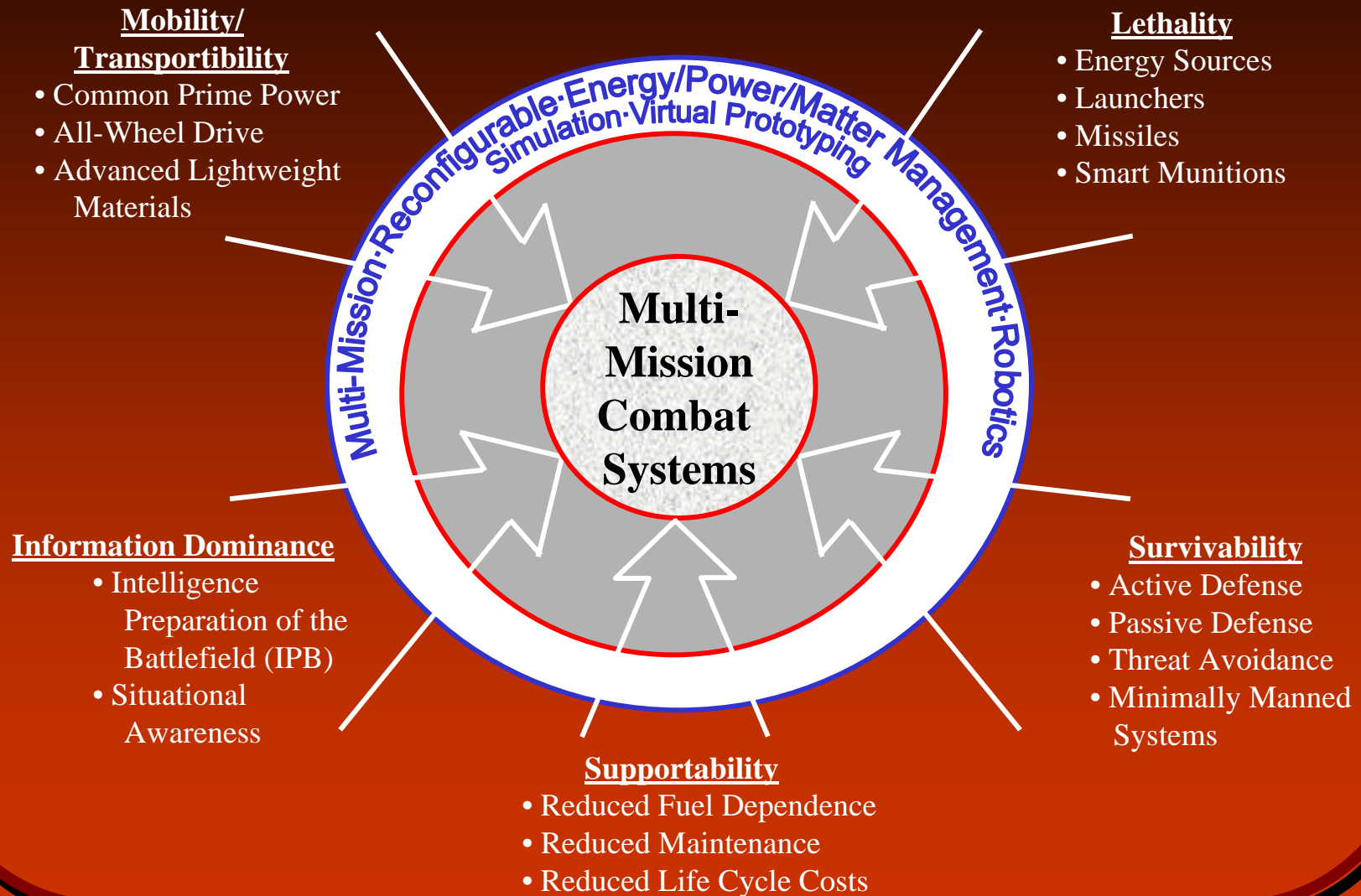




# Total Systems Approach Is Needed

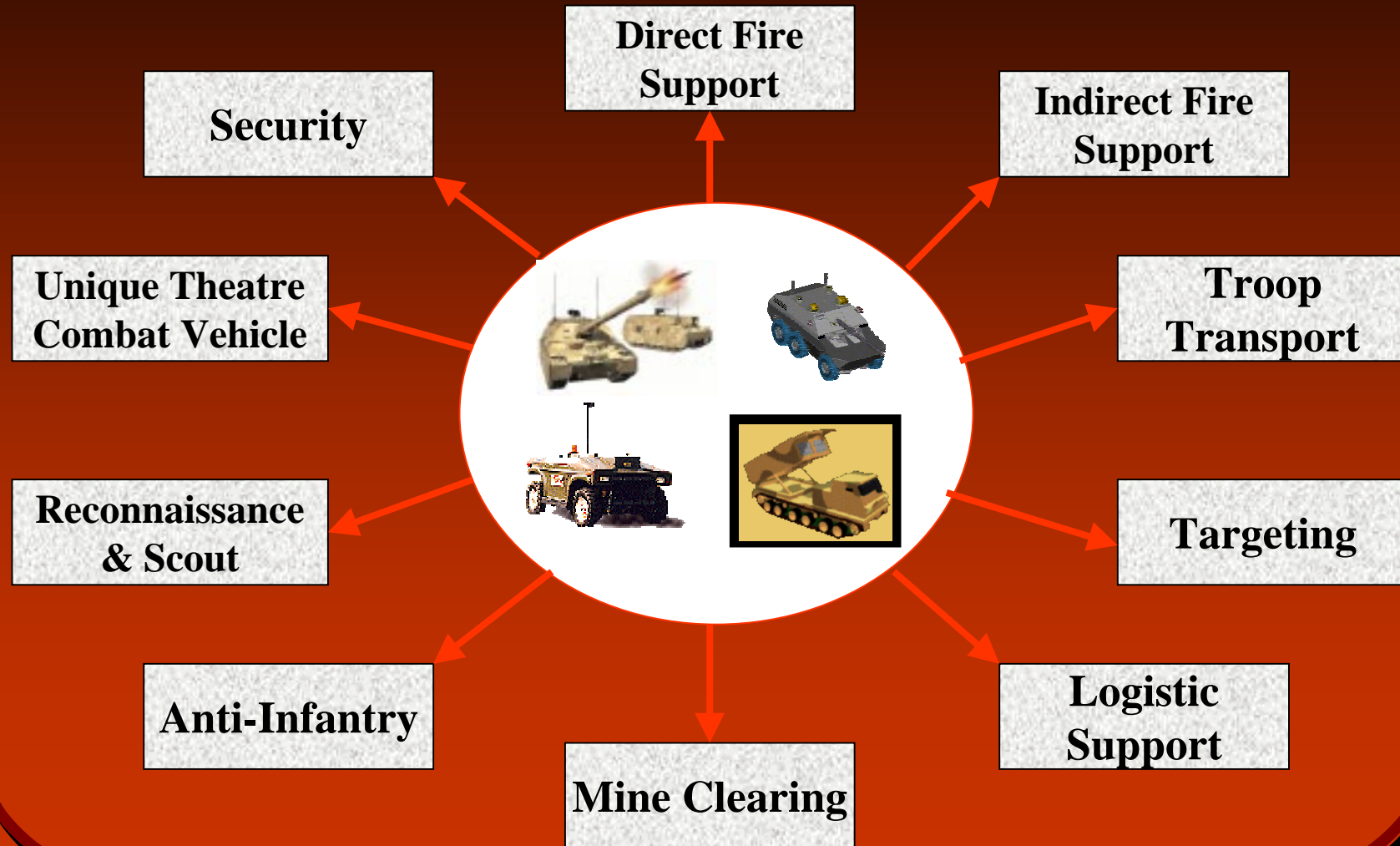


## New Design Philosophy



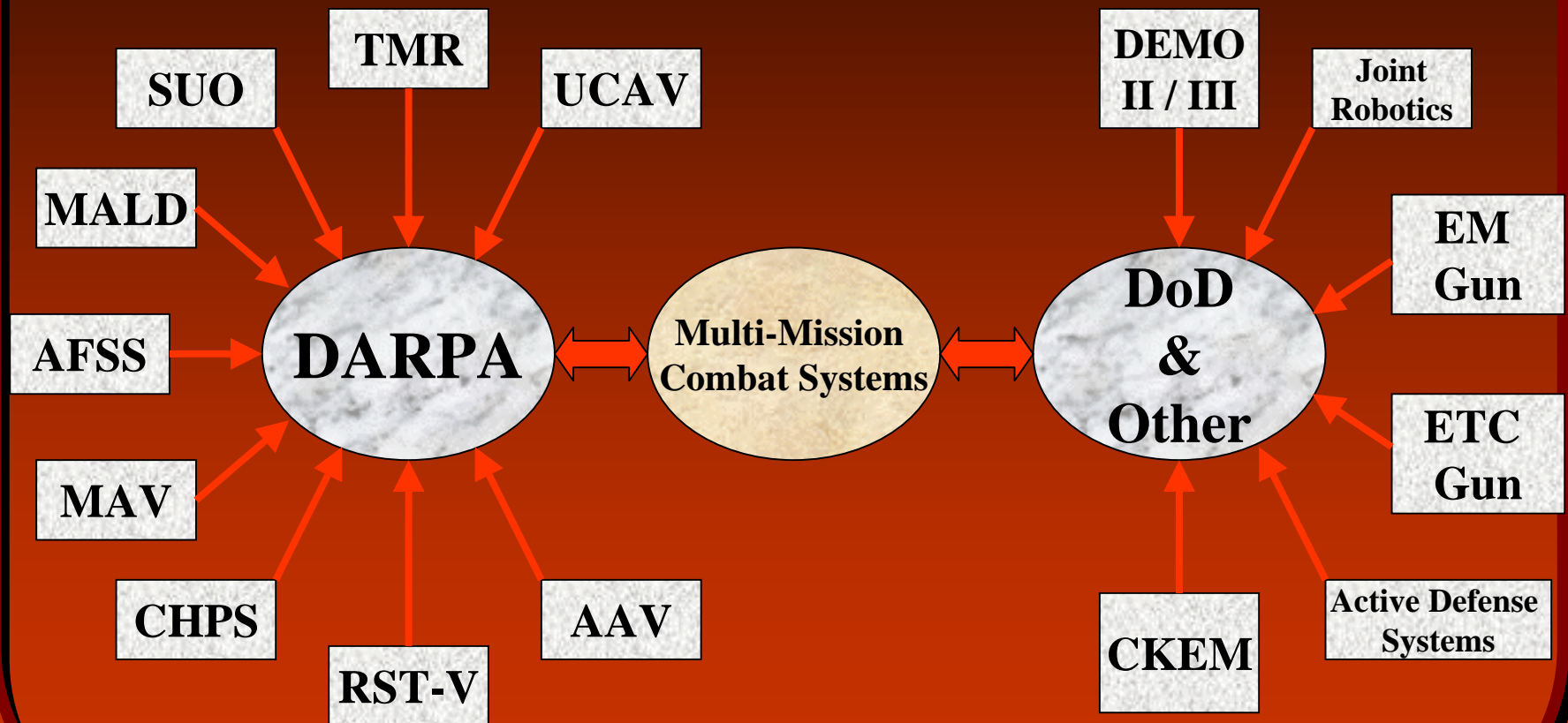


# Multi-mission Systems





# Technologies & Concepts From Existing Programs



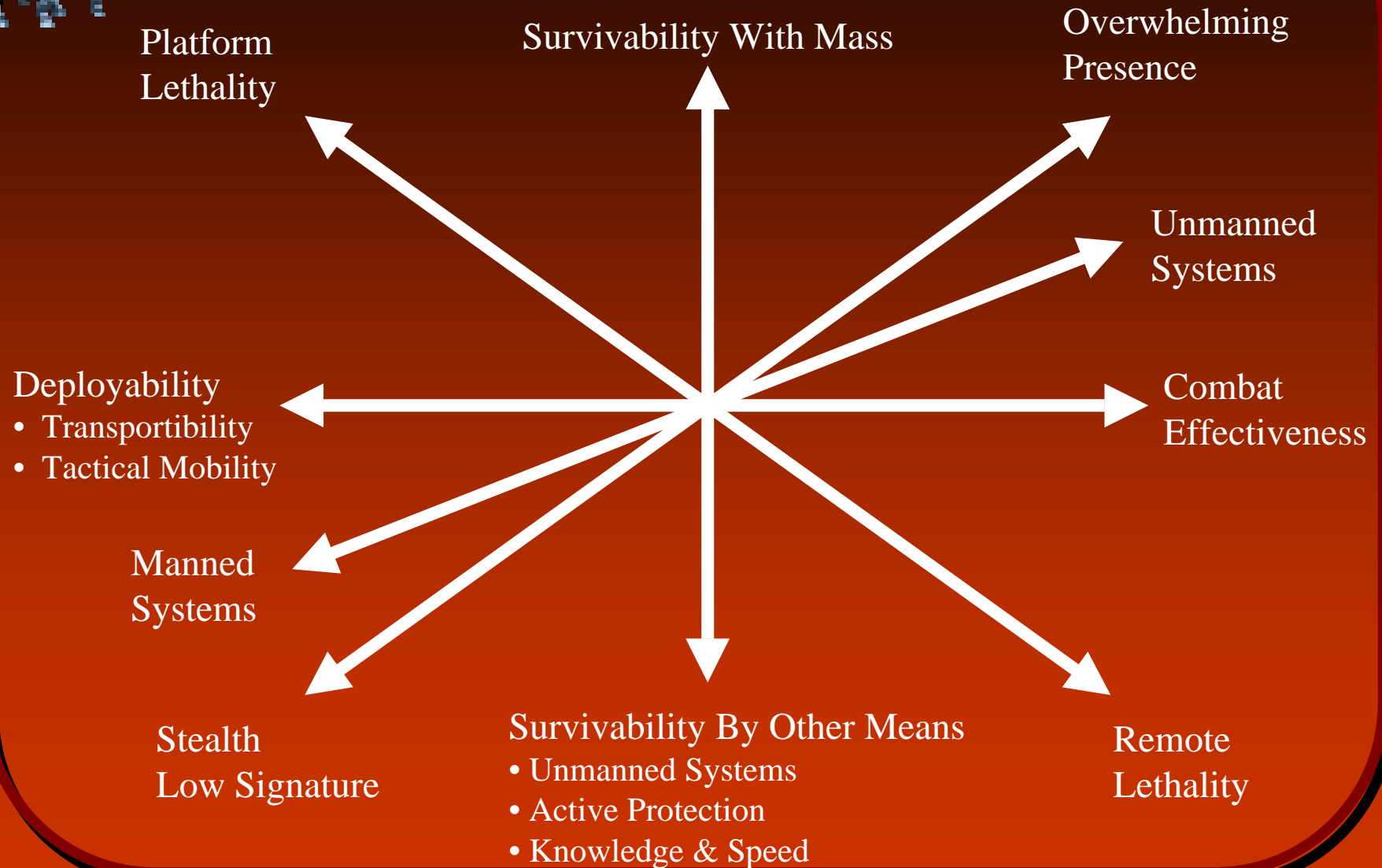


# DARPA/Army Study Concept

- Use total systems approach for Multi-Mission Combat Systems:
  - Multi-functional/multi-mission capabilities
  - Re-configurable systems
  - Enhanced survivability through manned/unmanned teaming, active defense, etc.
  - Enhanced lethality/mission effectiveness
  - Enhanced situational awareness
  - Energy and power management with multi-function components

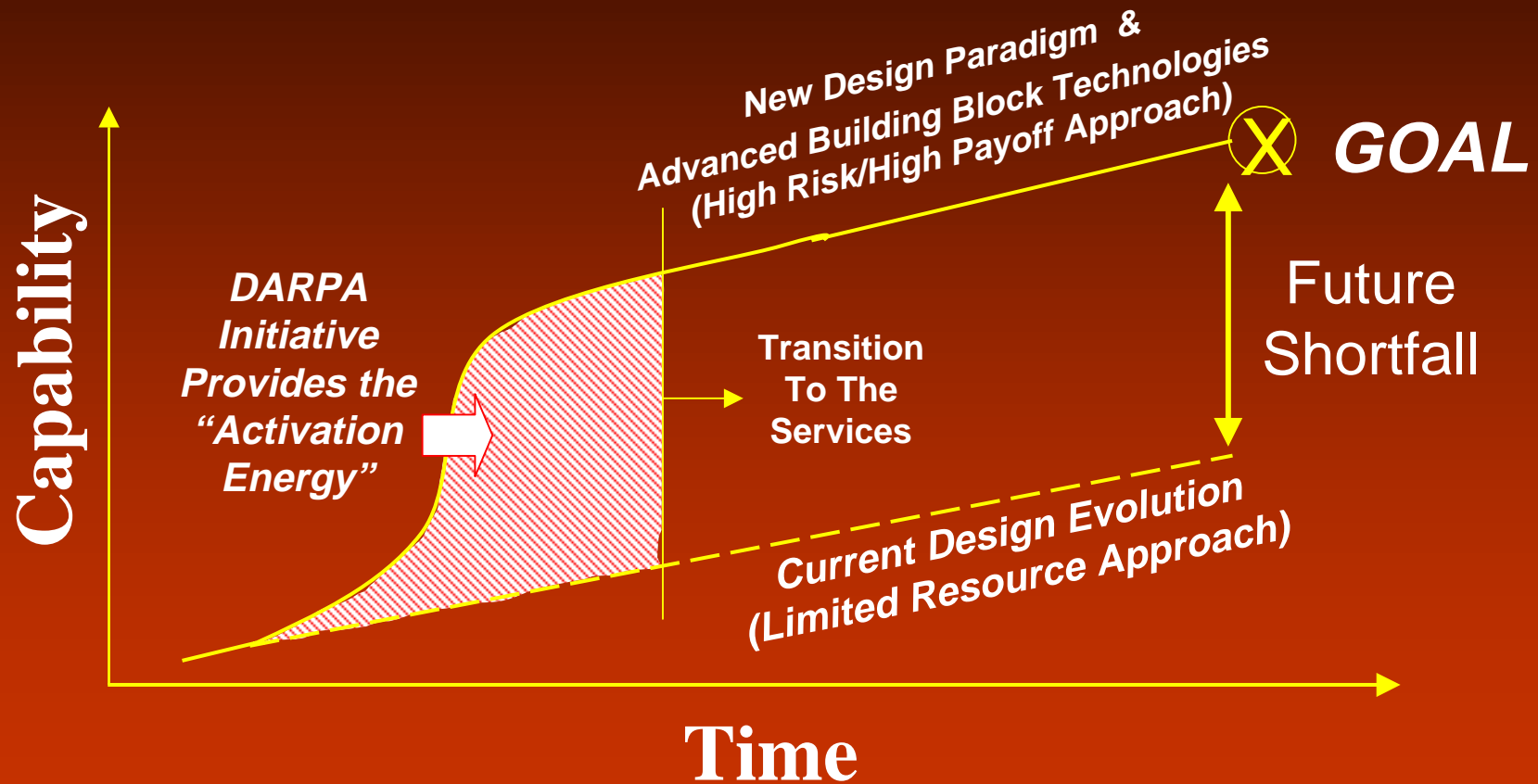


# Study Azimuths





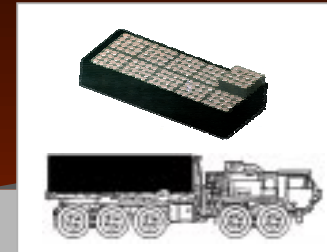
# DARPA Role





# Study Program Plan

- **Identify high risk/high payoff concepts**
- **Identify issues with manned/unmanned teaming, advanced weapons systems**
- **Assess systems capabilities against appropriate missions**
- **Identify existing program crossovers**
- **Identify enabling technologies**



# Multi-Mission Combat Systems